FIG. 1

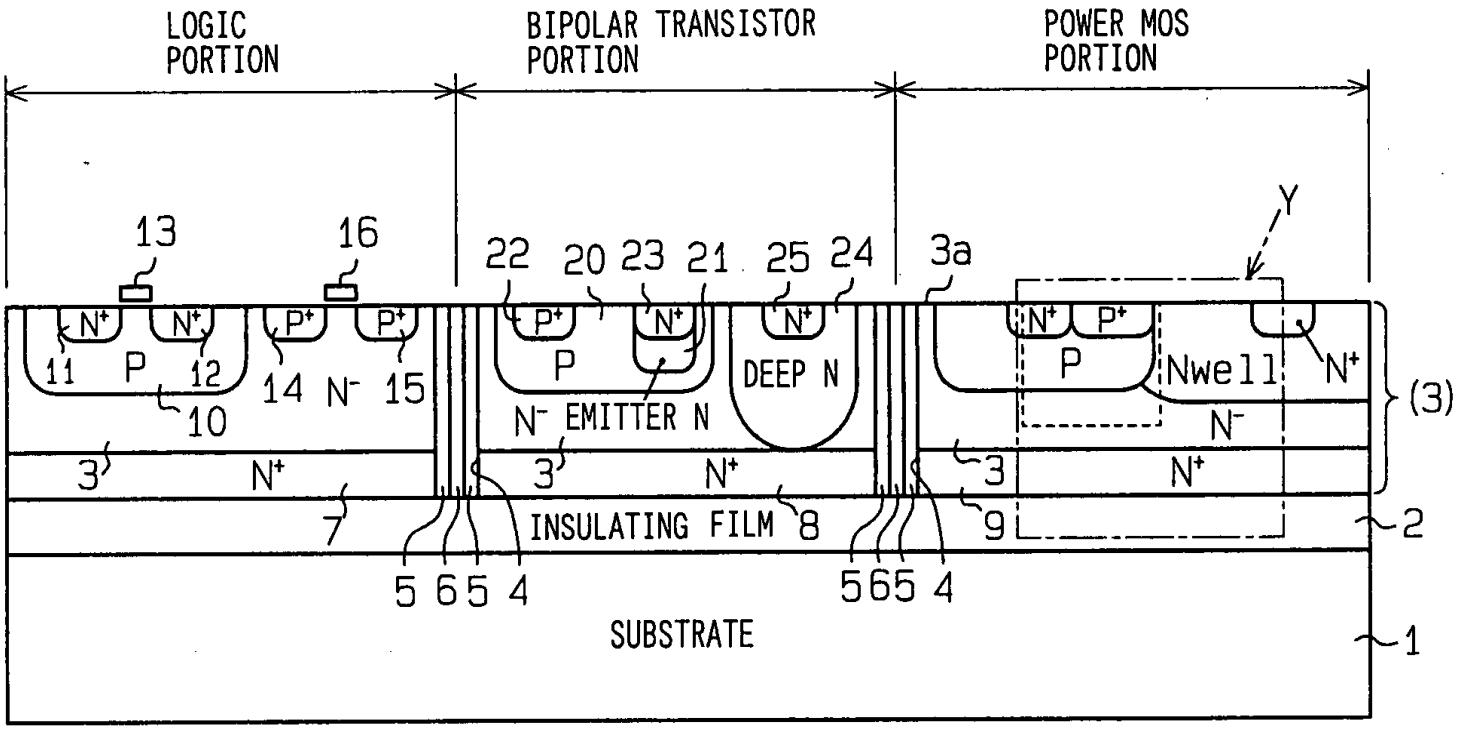
LOGIC PORTION
BIPOLAR TRANSISTOR PORTION
POWER MOS PORTION
13
16
22
20
23
21
25
24
3a
Y
N+
P+
11
P
12
10
14
N-
15
EMITTER N
DEEP N
Nwell
(3)
3
7
INSULATING FILM
8
9
2
5
6
4
SUBSTRATE
1

FIG. 2

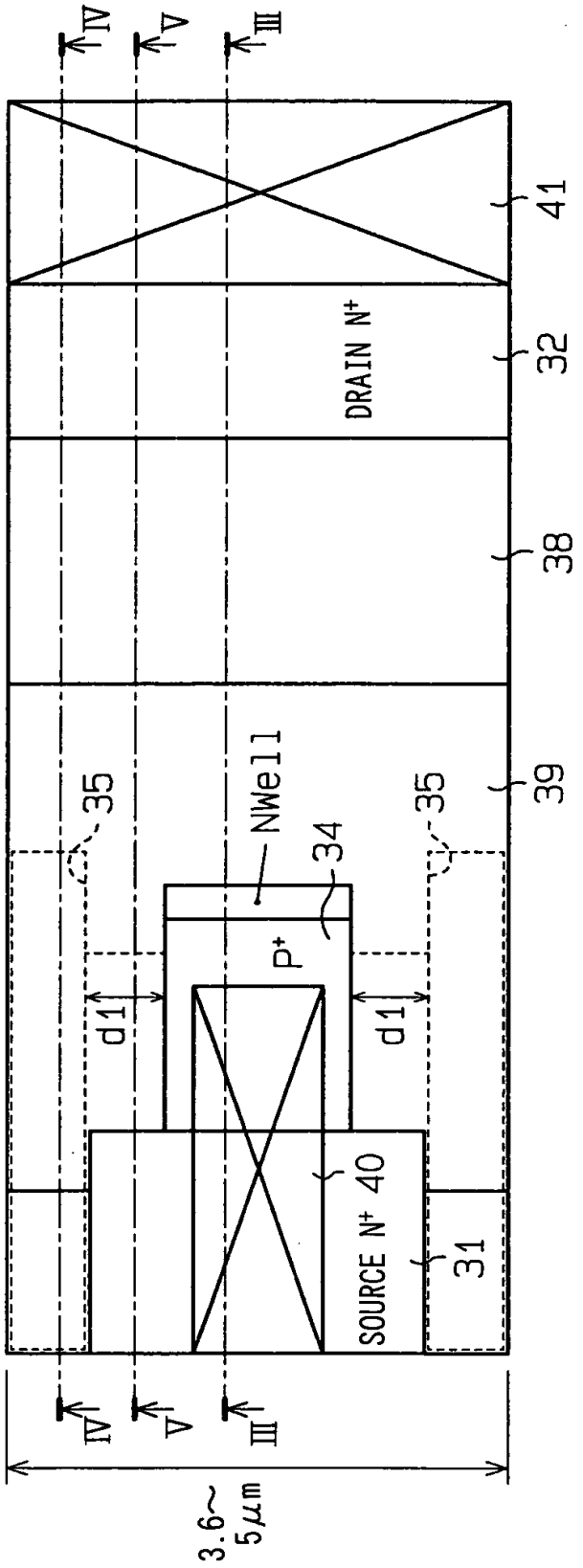
IV
V
III
41
DRAIN N+
32
38
39
35
NWell
34
35
P+
d1
d1
SOURCE N+ 40
31
IV
V
III
3.6~
5μm

FIG. 3

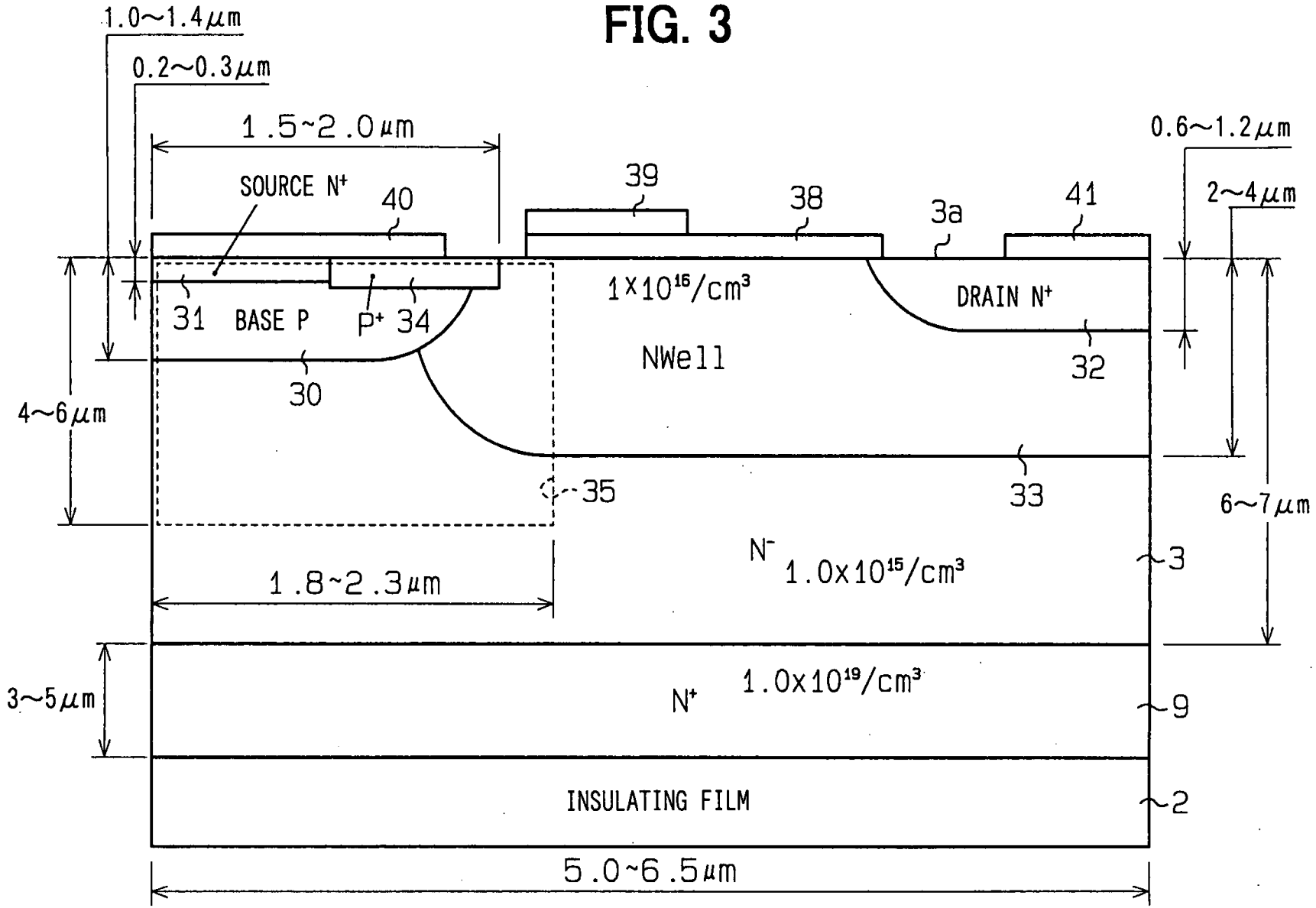
1.0~1.4μm
0.2~0.3μm
1.5~2.0μm
SOURCE N+
40
39
38
3a
41
0.6~1.2μm
2~4μm
31
BASE P
P+ 34
1×10^16/cm^3
DRAIN N+
NWell
32
30
4~6μm
35
33
6~7μm
N-
1.0x10^15/cm^3
3
1.8~2.3μm
3~5μm
N+
1.0x10^19/cm^3
9
INSULATING FILM
2
5.0~6.5μm

FIG. 4

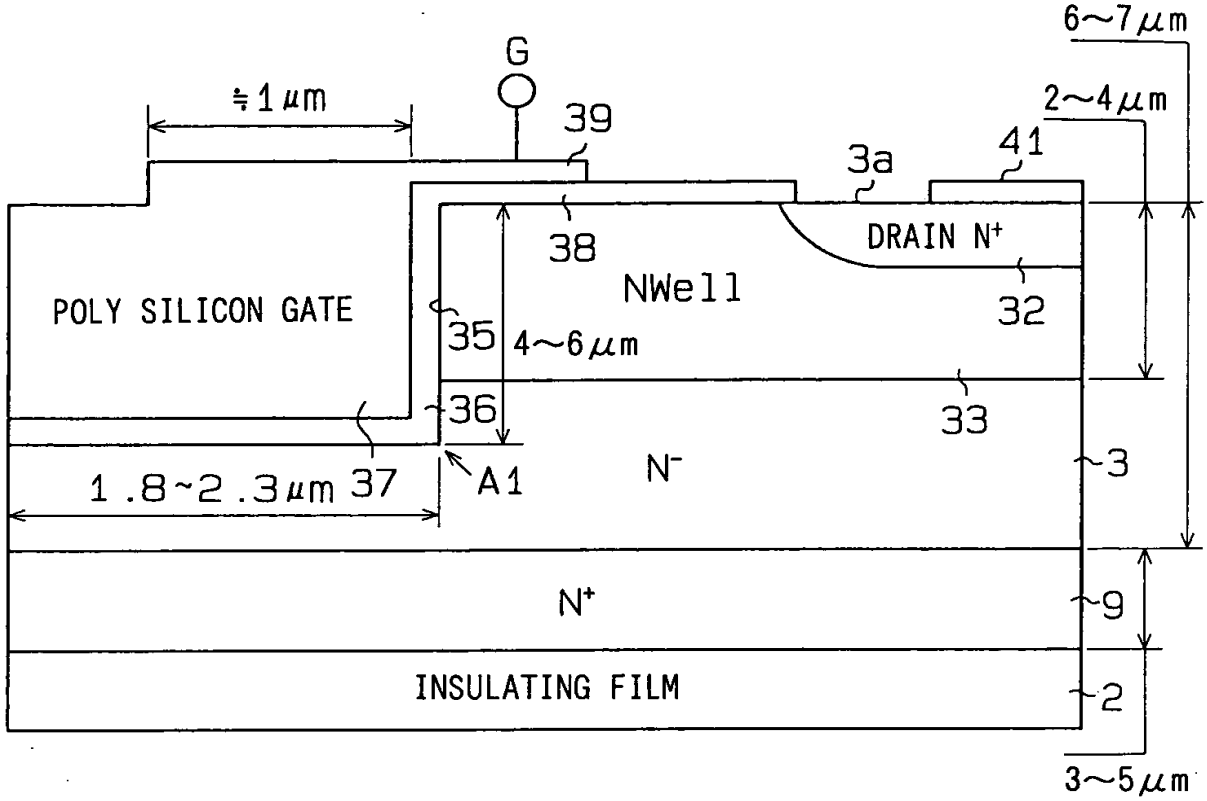
6~7μm
G
≒1μm
39
2~4μm
41
3a
38
DRAIN N+
NWell
POLY SILICON GATE
32
35
4~6μm
33
36
1.8~2.3μm
37
A1
N-
3
N+
9
INSULATING FILM
2
3~5μm

FIG. 5

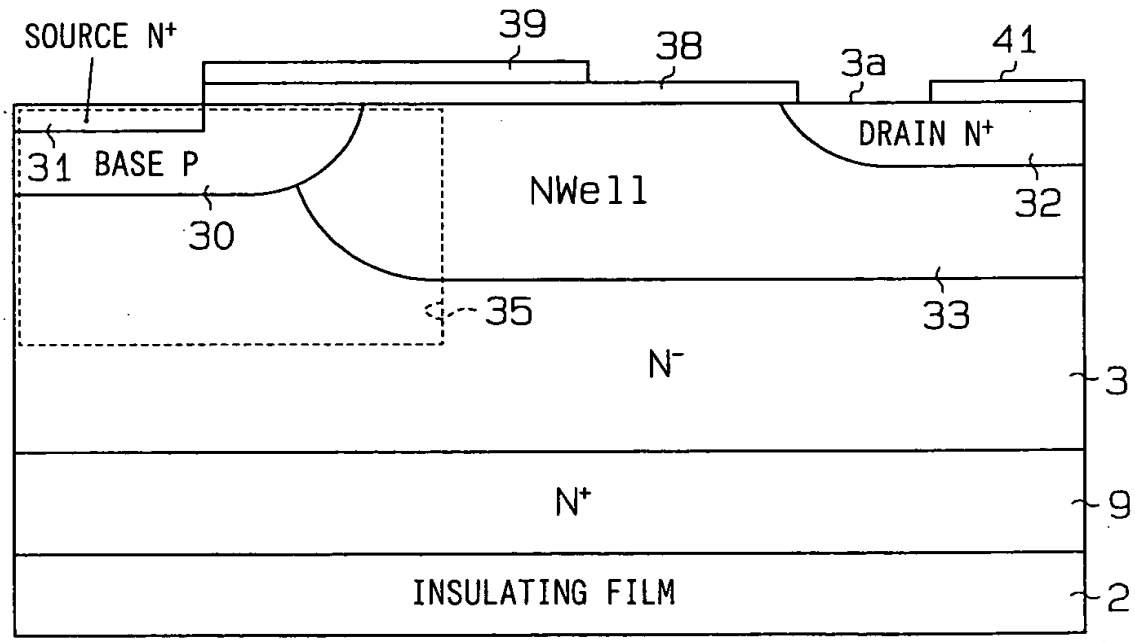
SOURCE N+
39
38
3a
41
DRAIN N+
31
BASE P
NWell
32
30
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 6

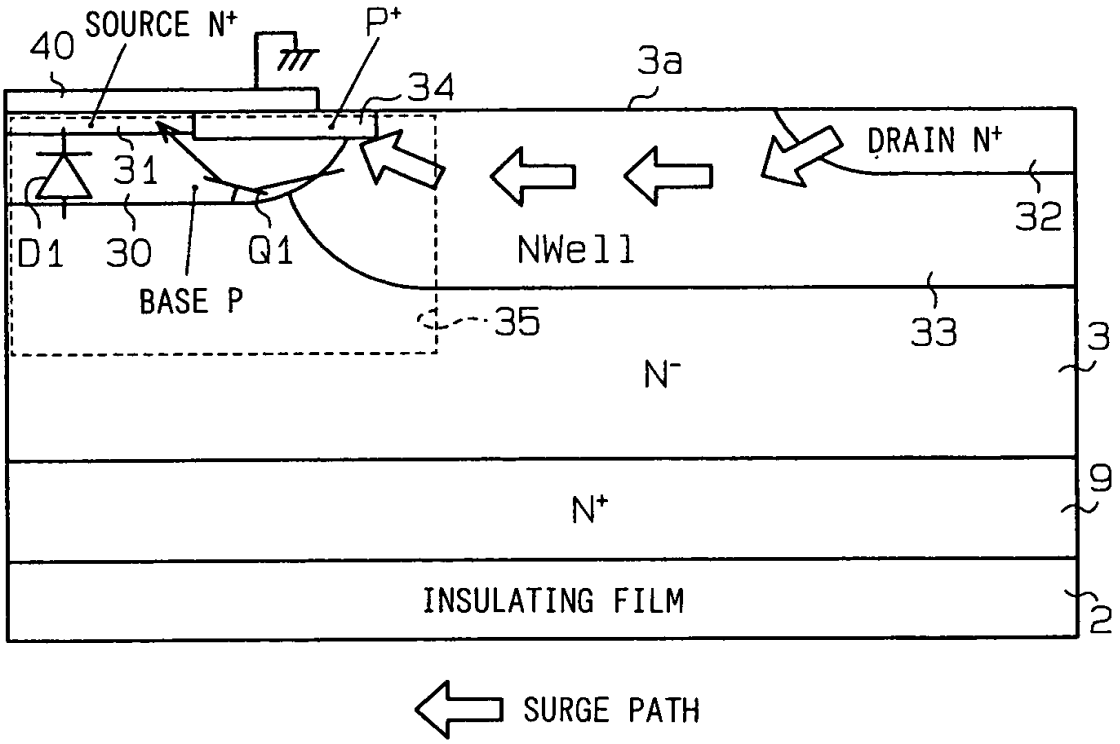
SOURCE N+
P+
40
34
3a
DRAIN N+
31
32
D1
30
Q1
NWell
BASE P
35
33
3
N-
9
N+
INSULATING FILM
2
SURGE PATH

FIG. 7

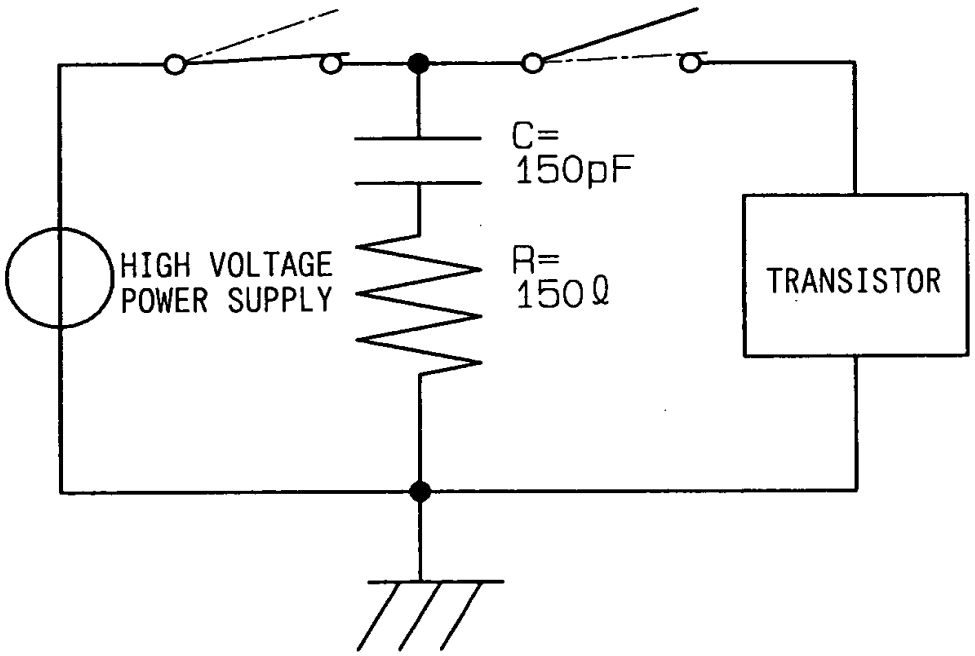
C=
150pF
HIGH VOLTAGE
POWER SUPPLY
R=
150Ω
TRANSISTOR

FIG. 8A

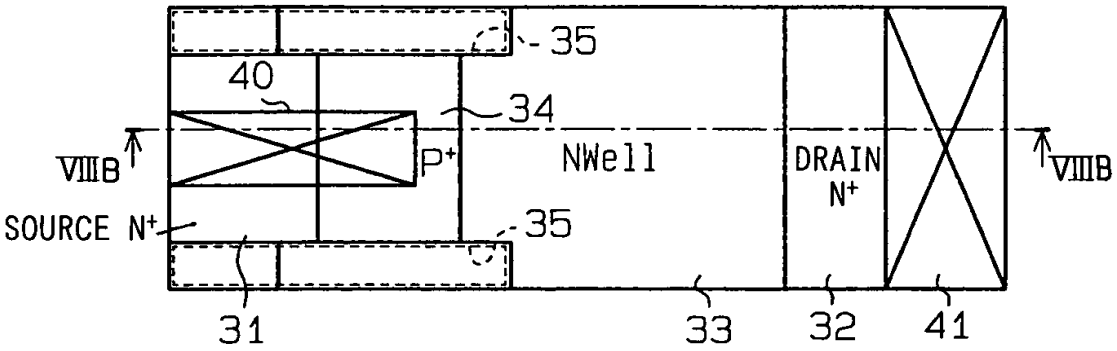
35
40
34
VIIIB
P+
NWell
DRAIN
N+
VIIIB
SOURCE N+
35
31
33
32
41

FIG. 8B

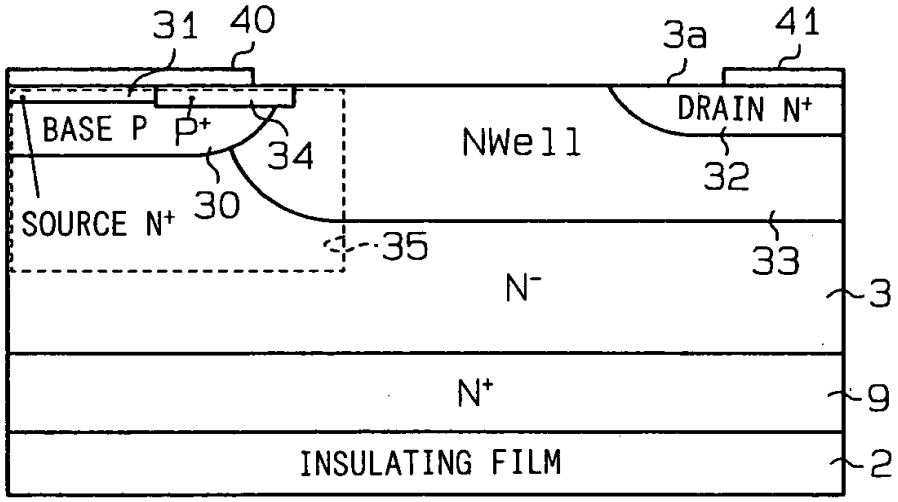
31
40
3a
41
BASE P
P+
34
NWell
DRAIN N+
32
SOURCE N+
30
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 9A

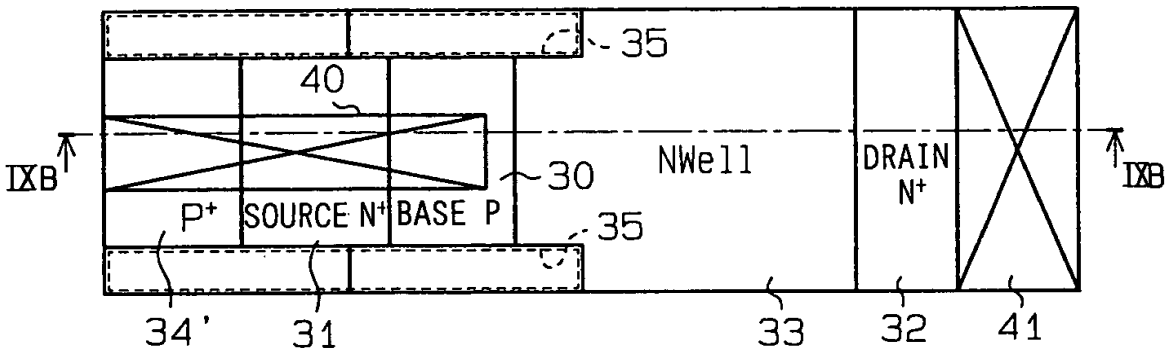
35
40
IXB
30
NWell
DRAIN
N+
IXB
P+
SOURCE N+
BASE P
35
34'
31
33
32
41

FIG. 9B

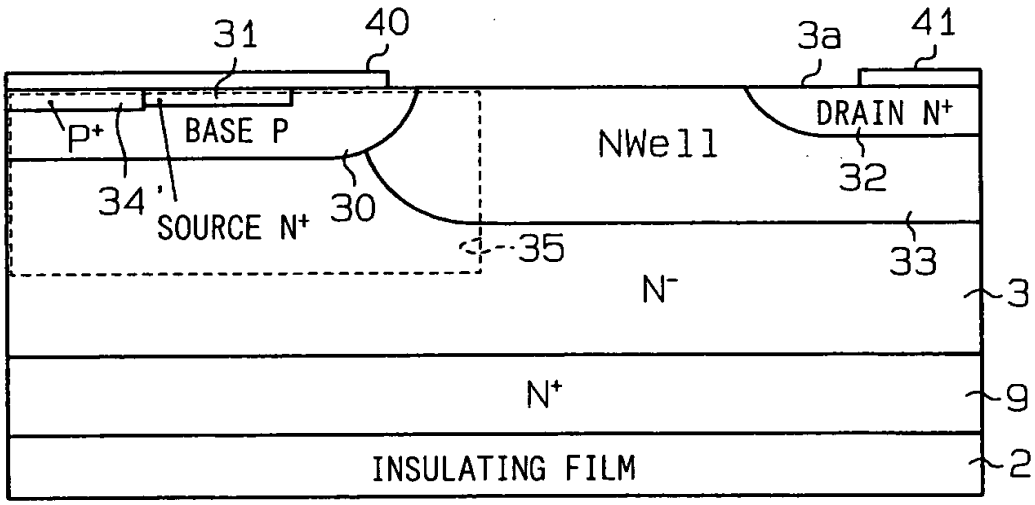
31
40
3a
41
P+
BASE P
NWell
DRAIN N+
32
34'
SOURCE N+
30
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 10

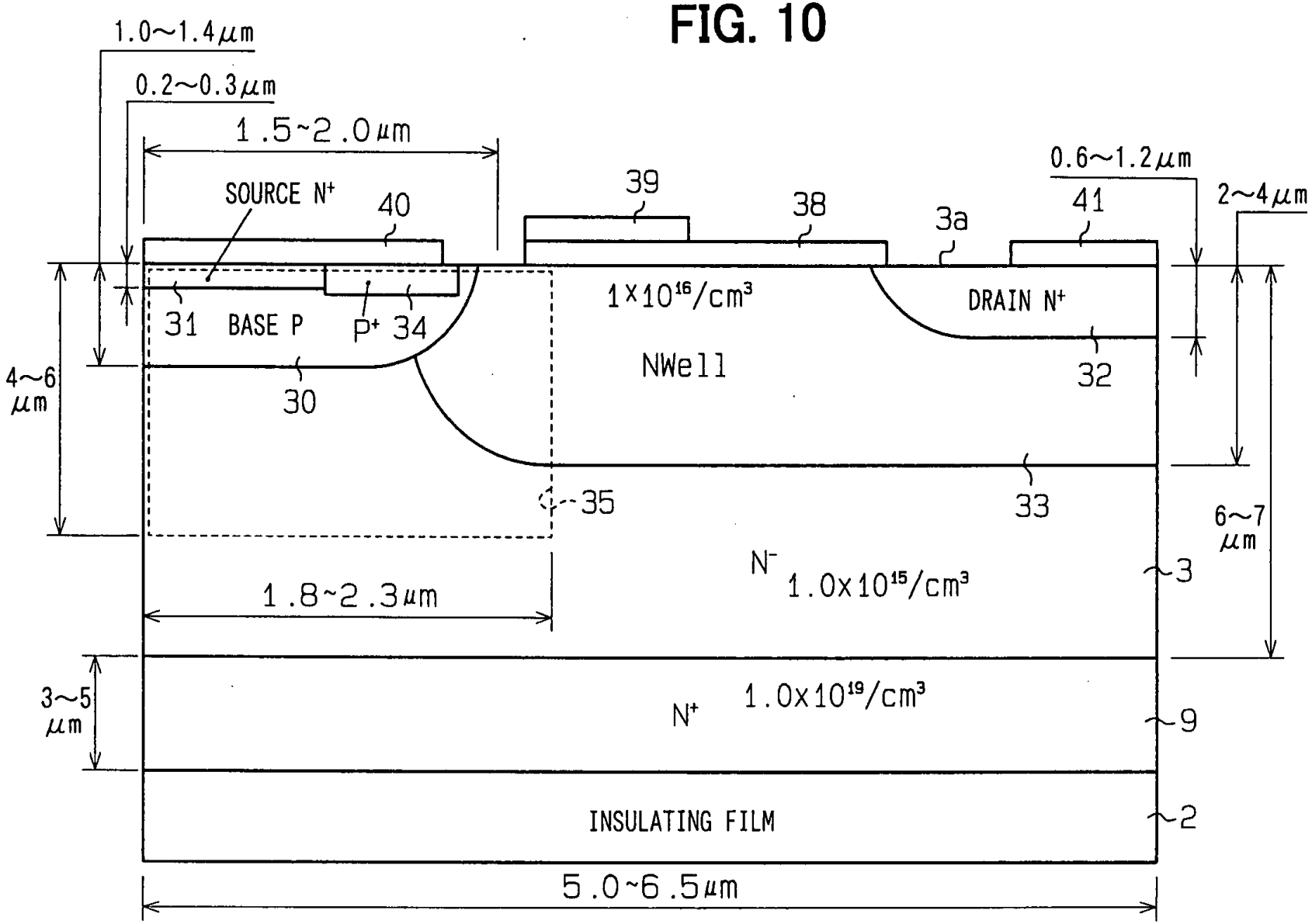
1.0~1.4μm
0.2~0.3μm
1.5~2.0μm
SOURCE N+
40
39
38
3a
41
0.6~1.2μm
2~4μm
31
BASE P
P+
34
1×10¹⁶/cm³
DRAIN N+
NWell
32
30
4~6μm
35
33
6~7μm
N⁻
1.0×10¹⁵/cm³
3
1.8~2.3μm
3~5μm
N+
1.0×10¹⁹/cm³
9
INSULATING FILM
2
5.0~6.5μm

FIG. 11A

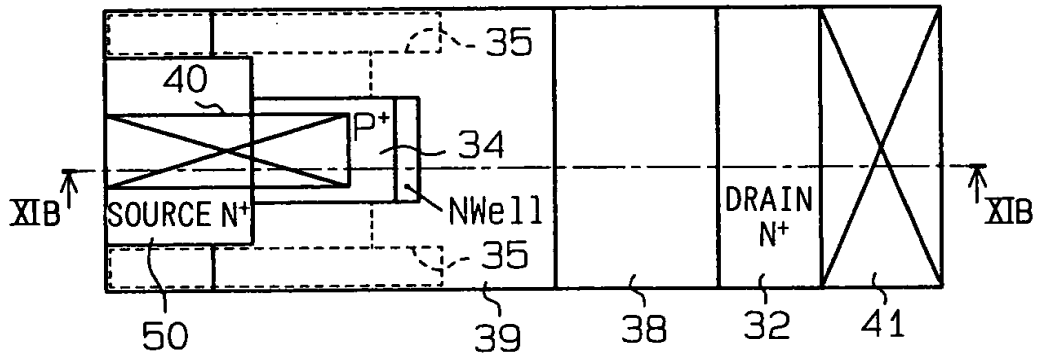

FIG. 11B

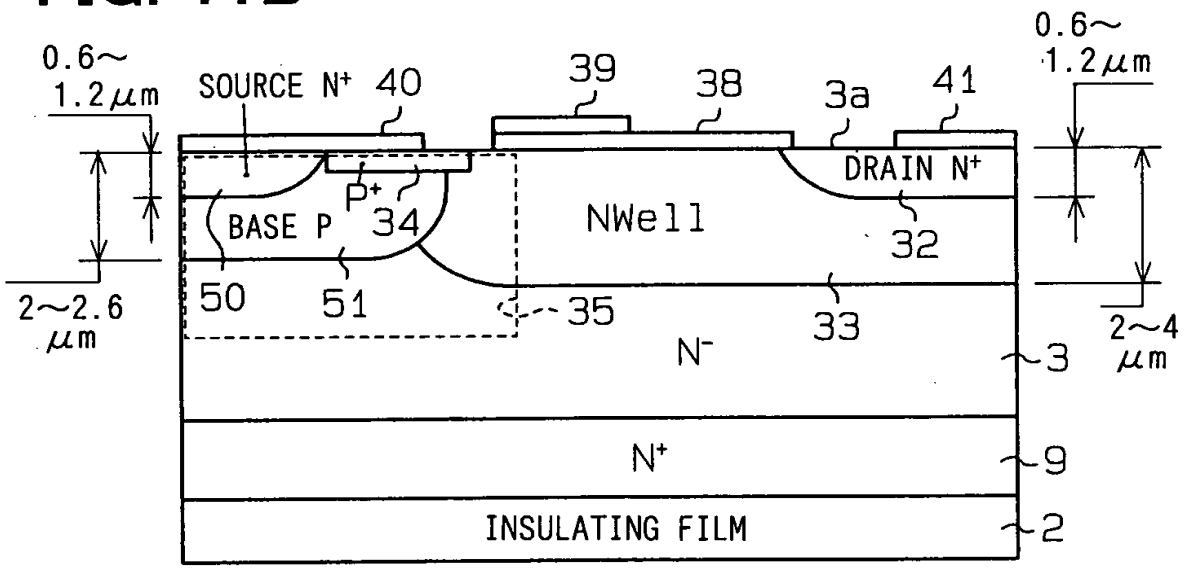

FIG. 12A

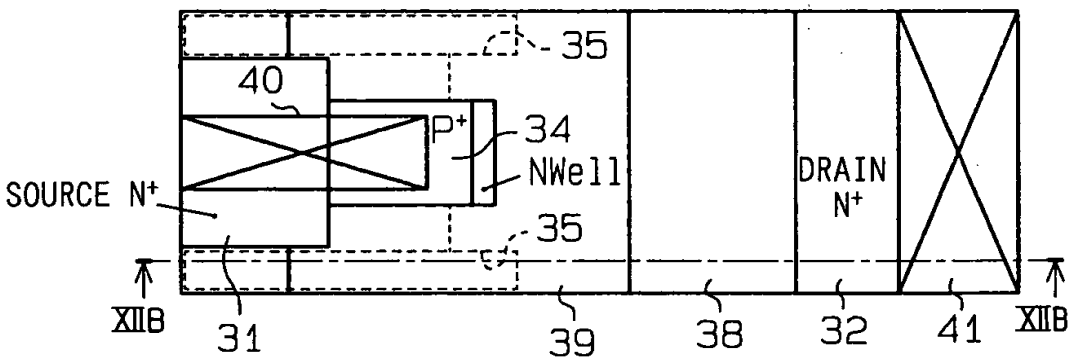

FIG. 12B

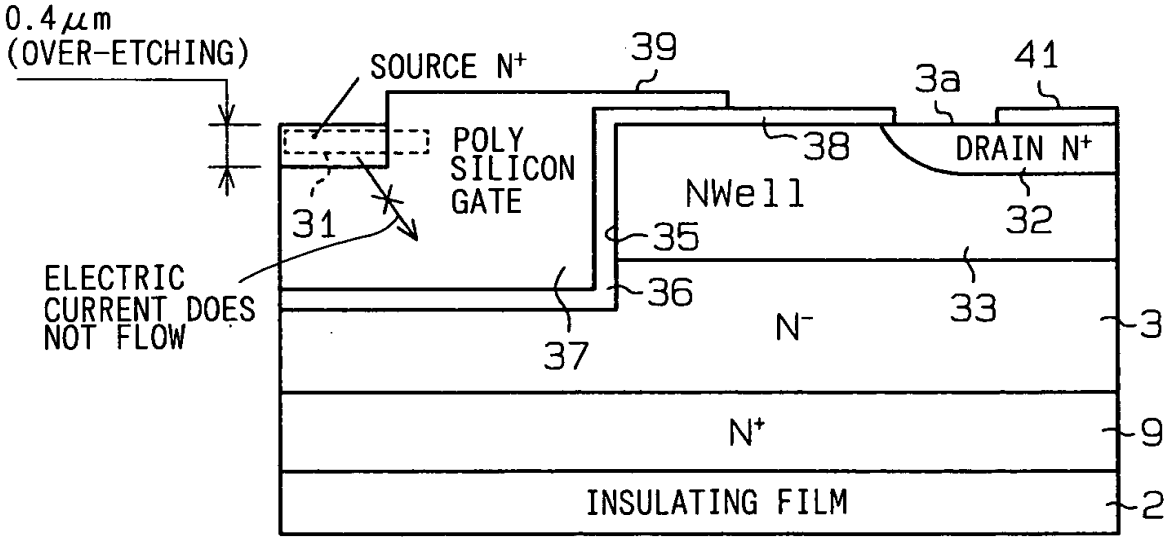

FIG. 13

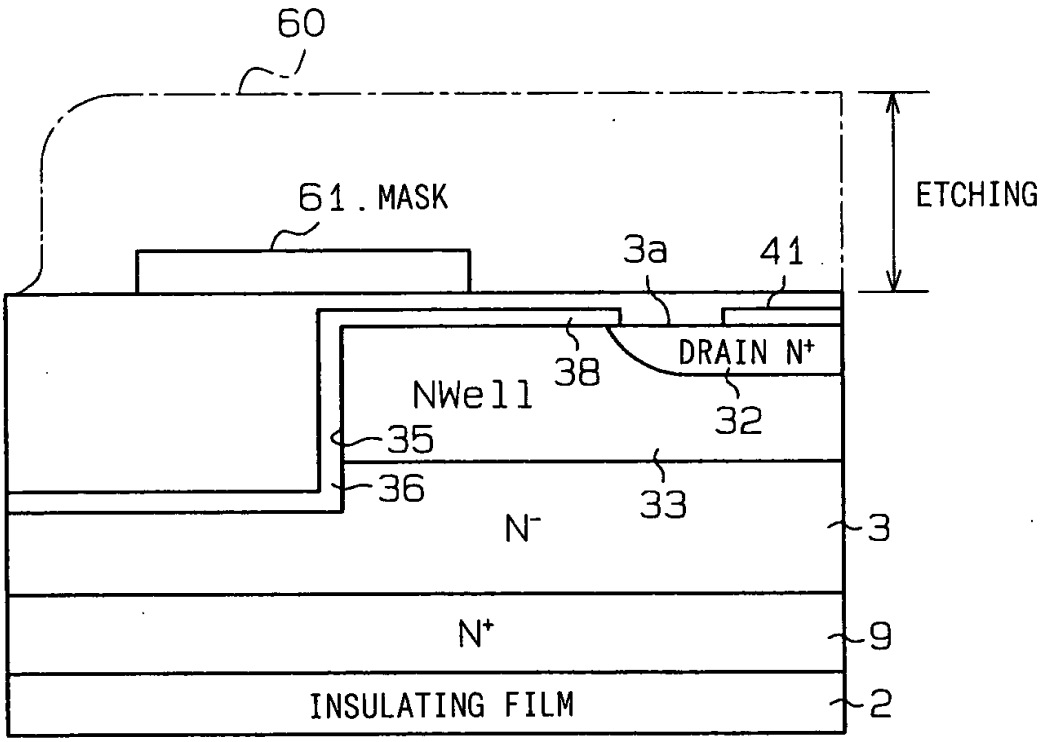
60
61 . MASK
ETCHING
3a
41
38
DRAIN N+
NWell
32
35
36
33
N-
3
N+
9
INSULATING FILM
2

FIG. 14A

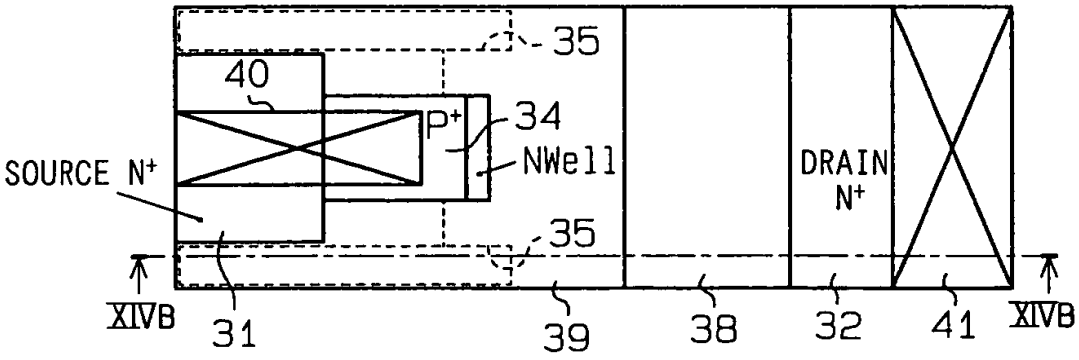

FIG. 14B

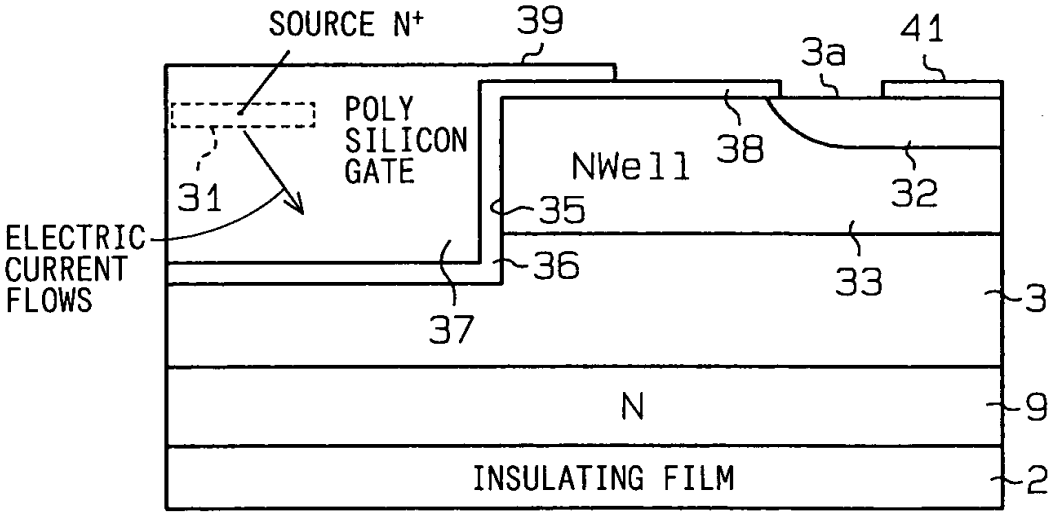

FIG. 15

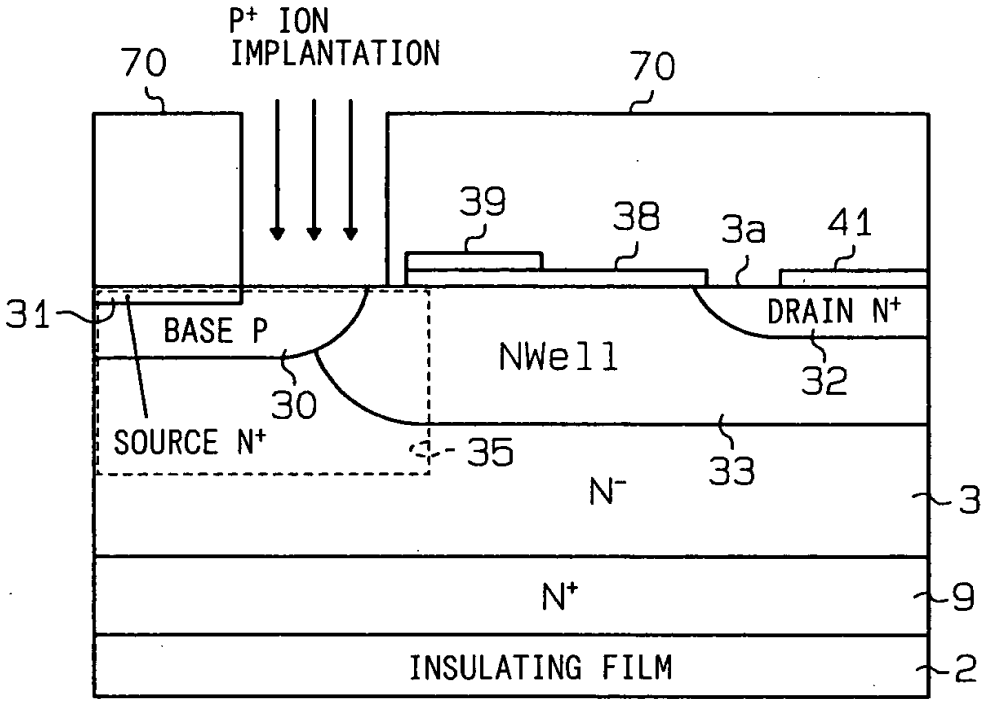
P+ ION
IMPLANTATION
70
70
39
38
3a
41
31
BASE P
DRAIN N+
NWell
32
30
SOURCE N+
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 16

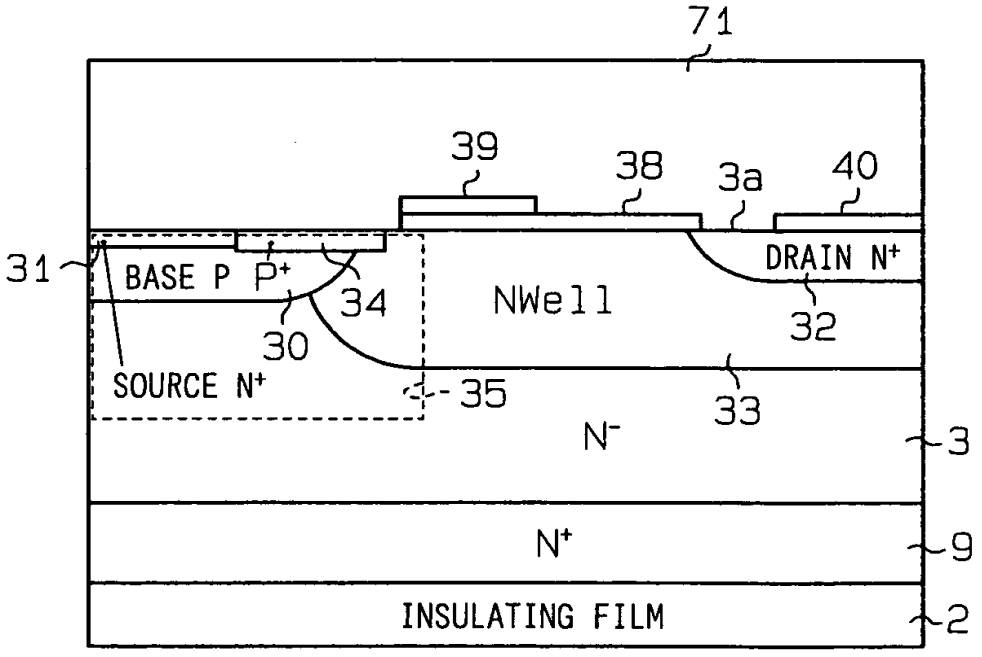
71
39
38
3a
40
31
BASE P
P+
DRAIN N+
34
NWell
32
30
SOURCE N+
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 17

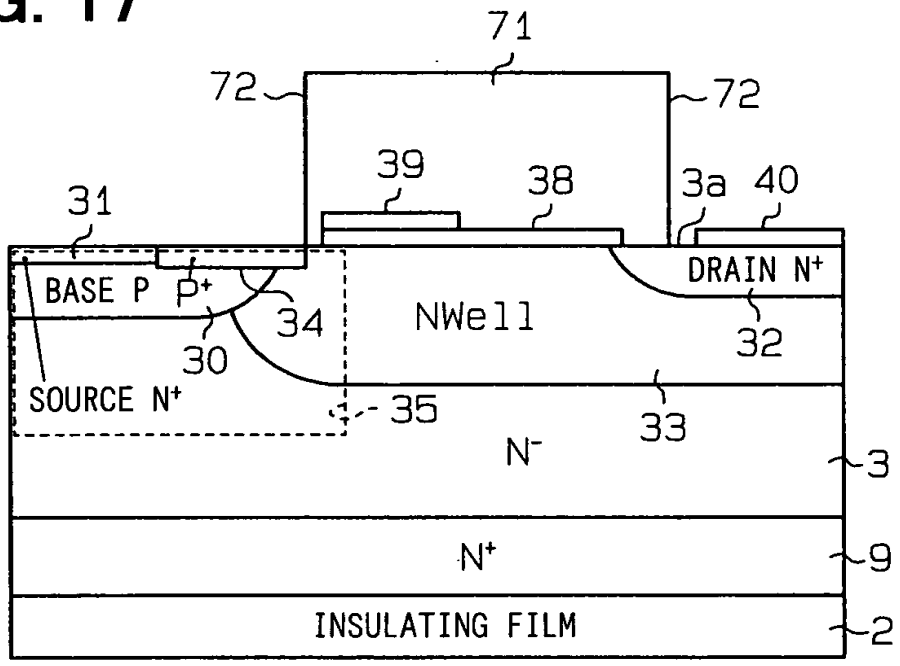
71
72
72
39
38
3a
40
31
BASE P
P+
34
NWell
DRAIN N+
30
32
SOURCE N+
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 18

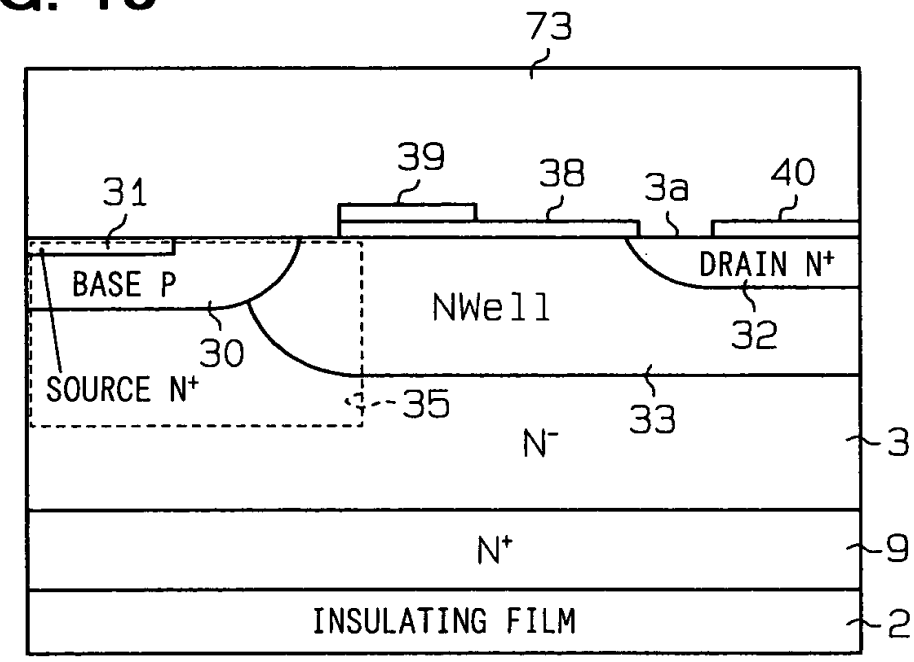
73
39
38
3a
40
31
BASE P
NWell
DRAIN N+
30
32
SOURCE N+
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 19

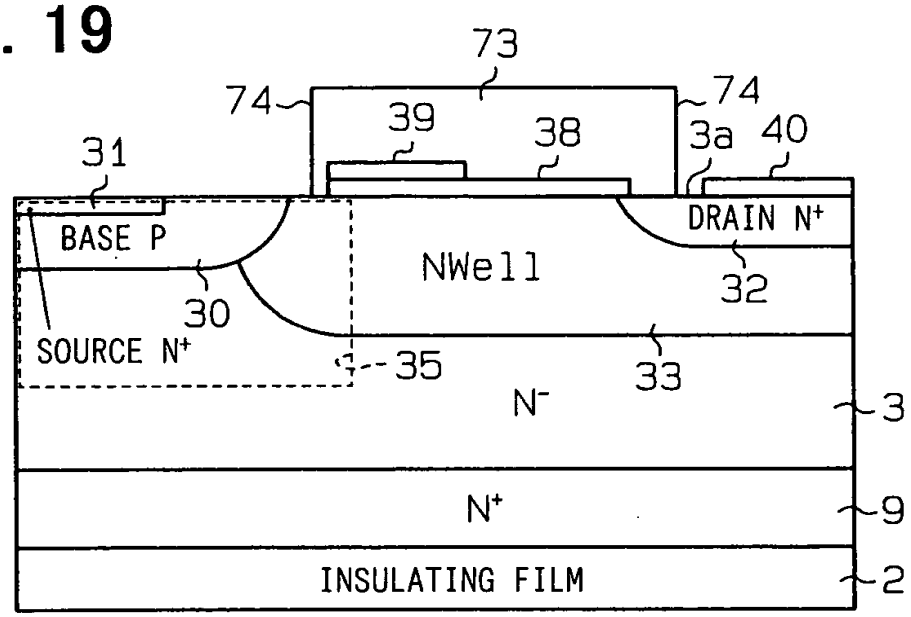
73
74
74
39
38
3a
40
31
BASE P
DRAIN N+
NWell
32
30
SOURCE N+
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 20

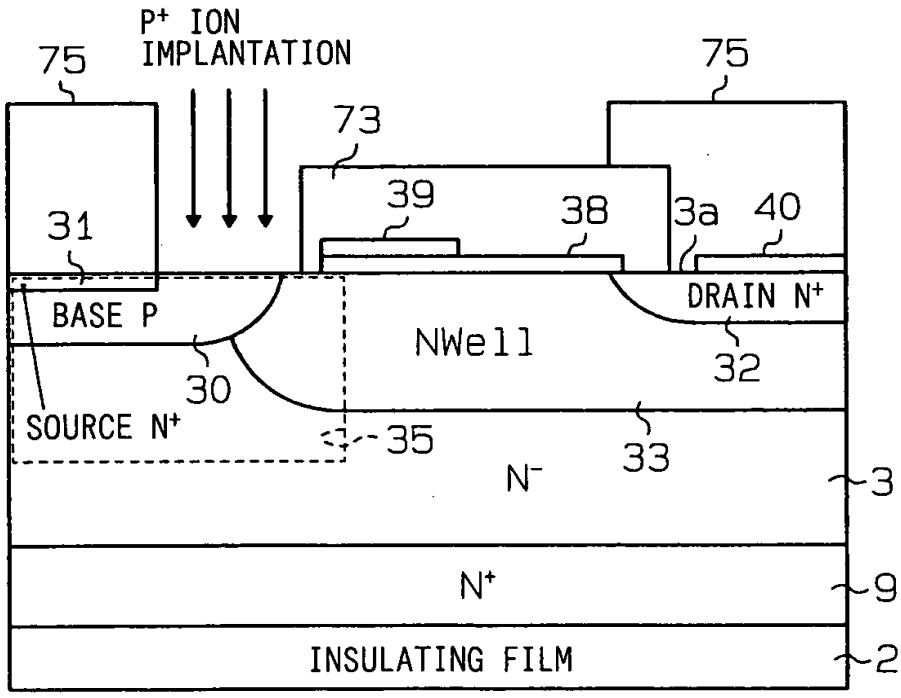
P+ ION
IMPLANTATION
75
75
73
39
38
3a
40
31
BASE P
DRAIN N+
NWell
32
30
SOURCE N+
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 21

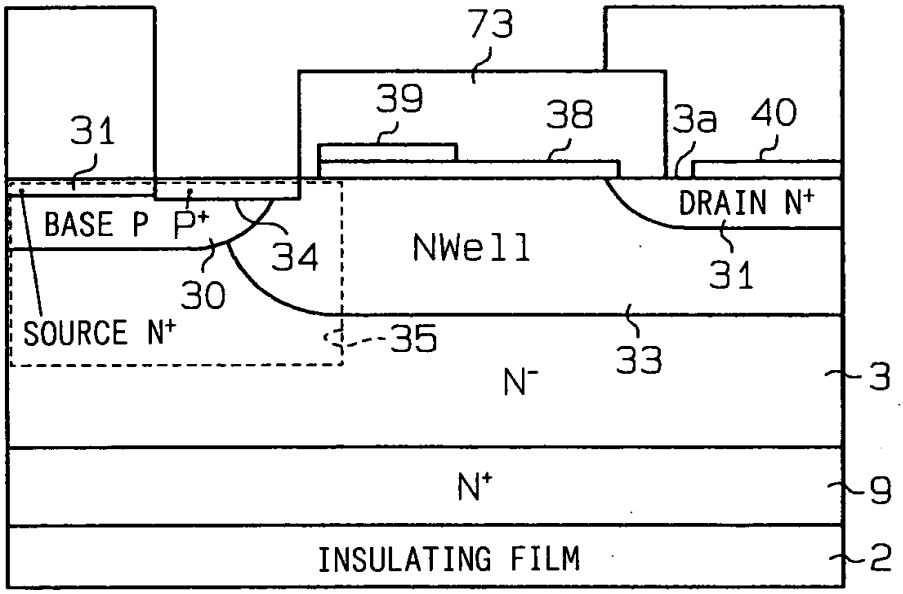
73
39
38
3a
40
31
DRAIN N+
BASE P
P+
34
NWell
31
30
SOURCE N+
35
33
N-
3
N+
9
INSULATING FILM
2

FIG. 22A

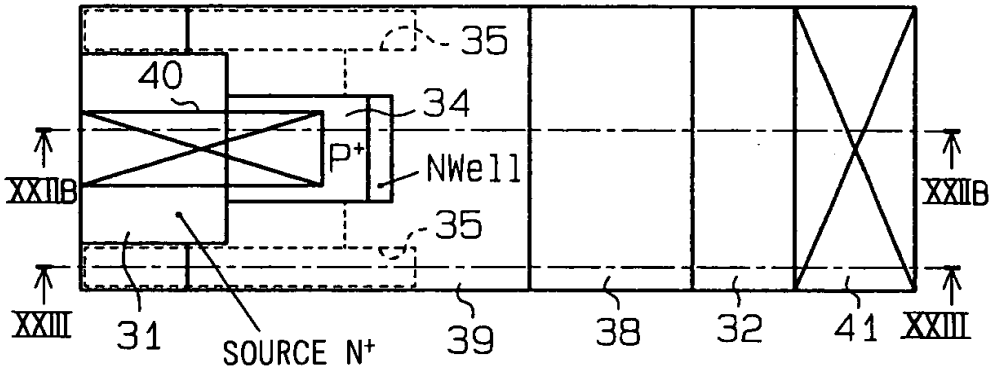

FIG. 22B

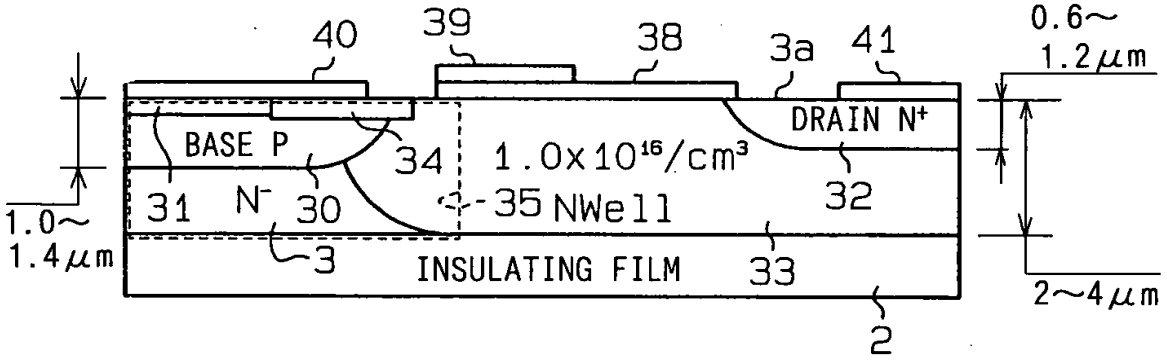

FIG. 23

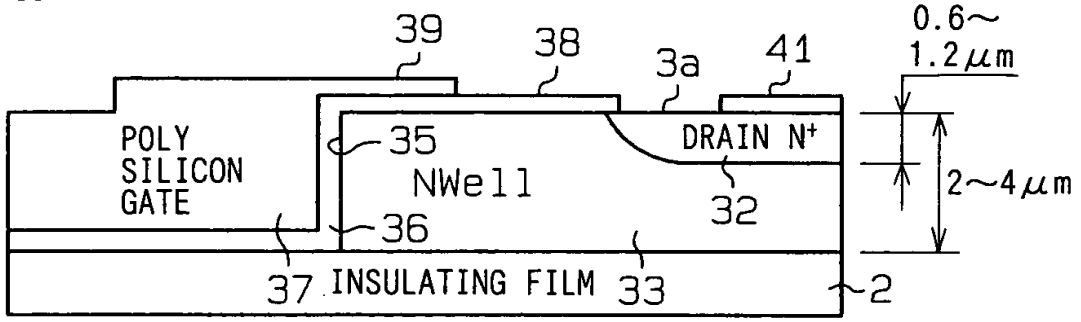

FIG. 24

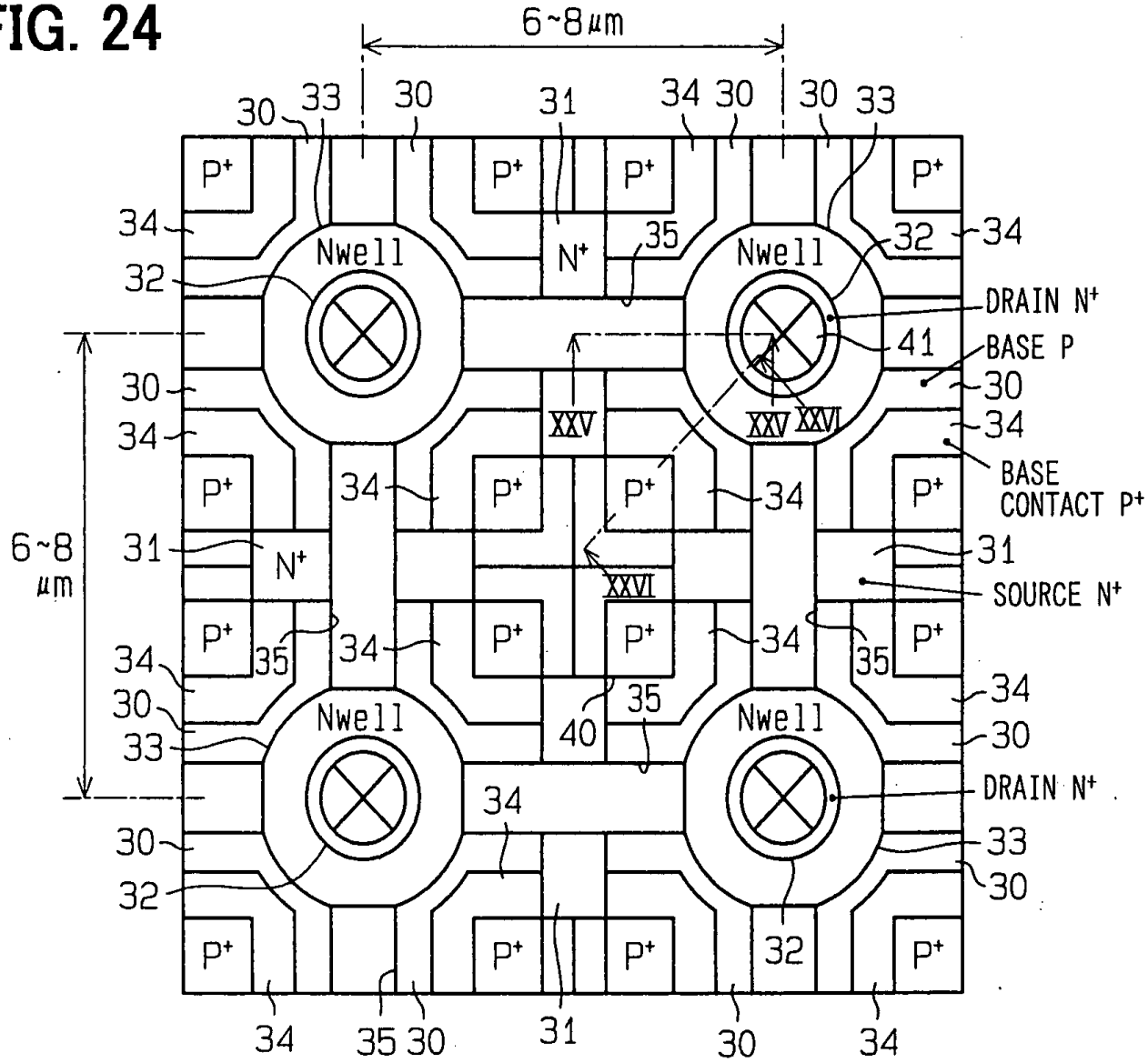
6~8μm
6~8 μm
Nwell
Nwell
Nwell
Nwell
P+
N+
DRAIN N+
BASE P
BASE CONTACT P+
SOURCE N+
XXV
XXVI
30
31
32
33
34
35
40
41

FIG. 25

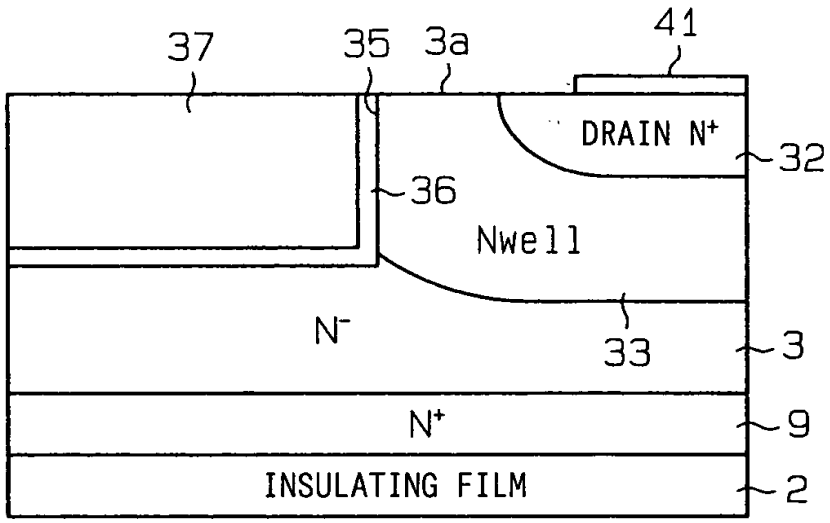
37
35
3a
41
DRAIN N+
32
36
Nwell
N-
33
3
N+
9
INSULATING FILM
2

FIG. 26

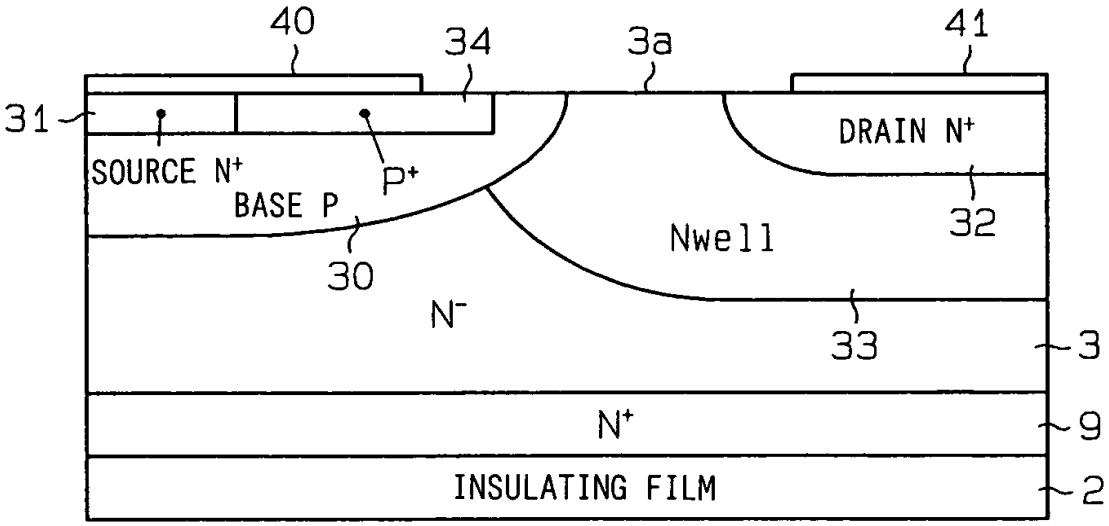
40
34
3a
41
31
SOURCE N+
P+
BASE P
DRAIN N+
32
Nwell
30
N-
33
3
N+
9
INSULATING FILM
2

FIG. 27

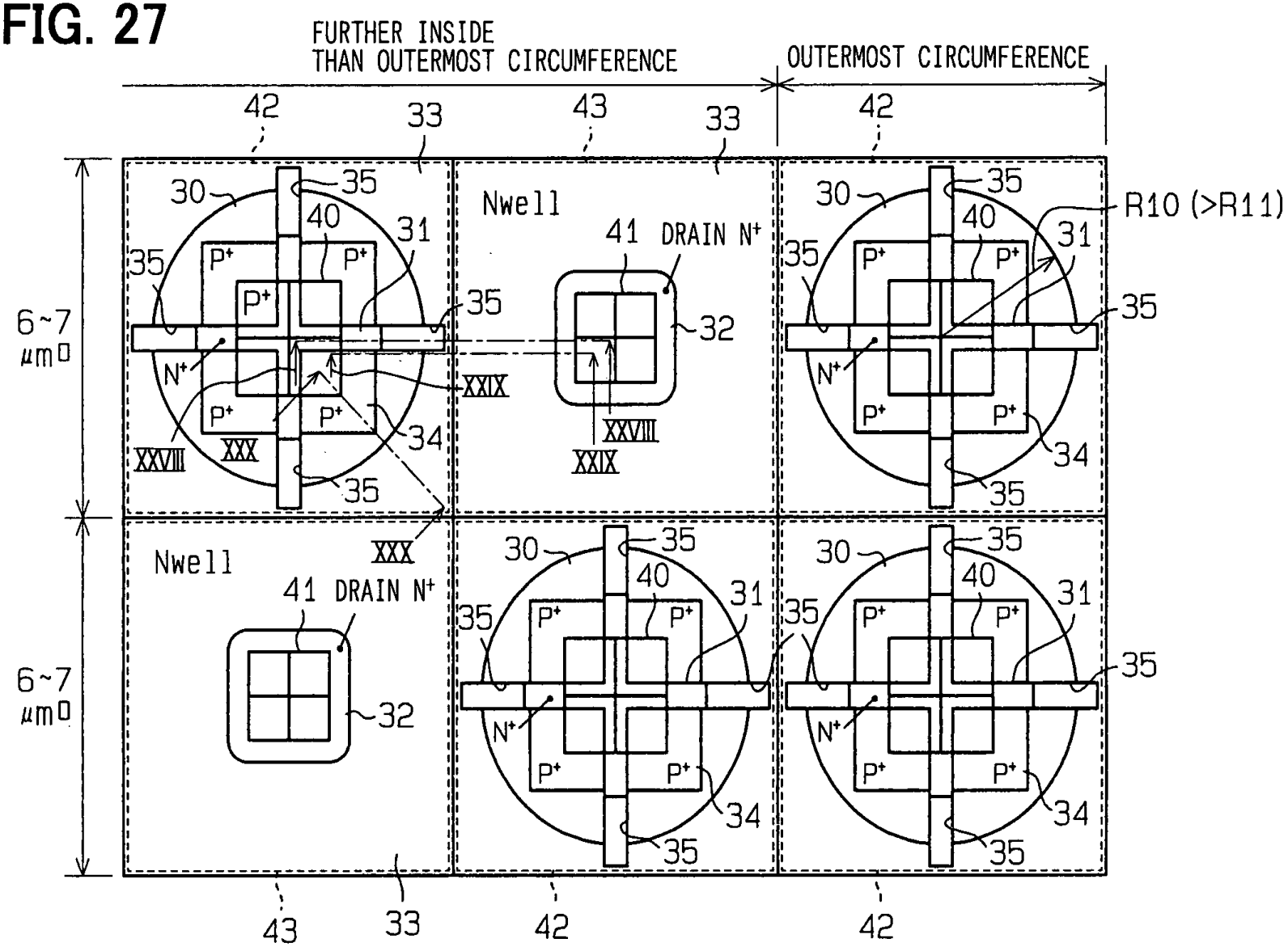
FURTHER INSIDE
THAN OUTERMOST CIRCUMFERENCE
OUTERMOST CIRCUMFERENCE
42
33
43
33
42
30
35
40
31
35
P+
P+
P+
35
N+
XXIX
P+
P+
34
XXVIII
XXX
35
Nwell
41 DRAIN N+
32
XXIX
XXVIII
R10 (>R11)
6~7 μm
6~7 μm
XXX
Nwell
41 DRAIN N+
32
43
33
42
42

FIG. 28

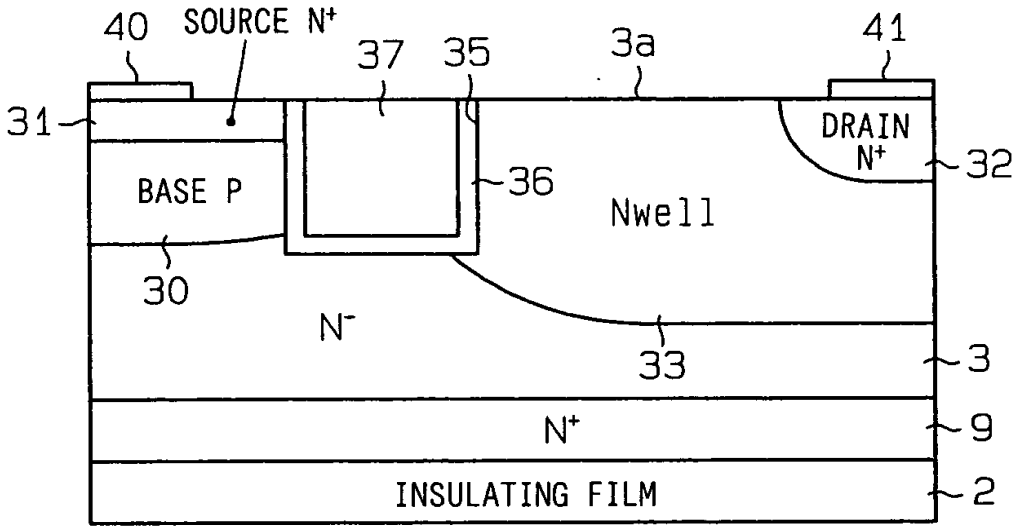
40
SOURCE N+
37
35
3a
41
31
DRAIN
N+
32
BASE P
36
Nwell
30
N-
33
3
N+
9
INSULATING FILM
2

FIG. 29

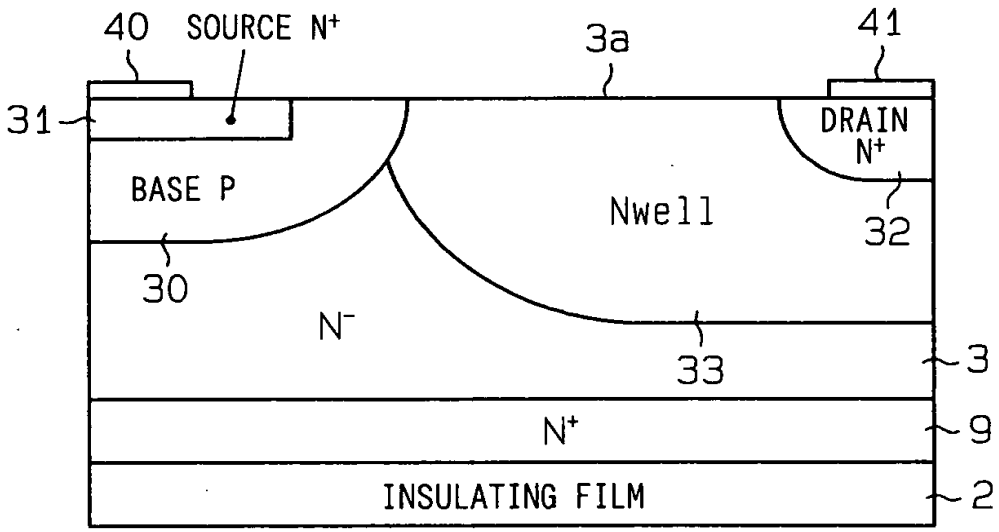
40
SOURCE N+
3a
41
31
DRAIN
N+
BASE P
Nwell
32
30
N-
33
3
N+
9
INSULATING FILM
2

FIG. 30

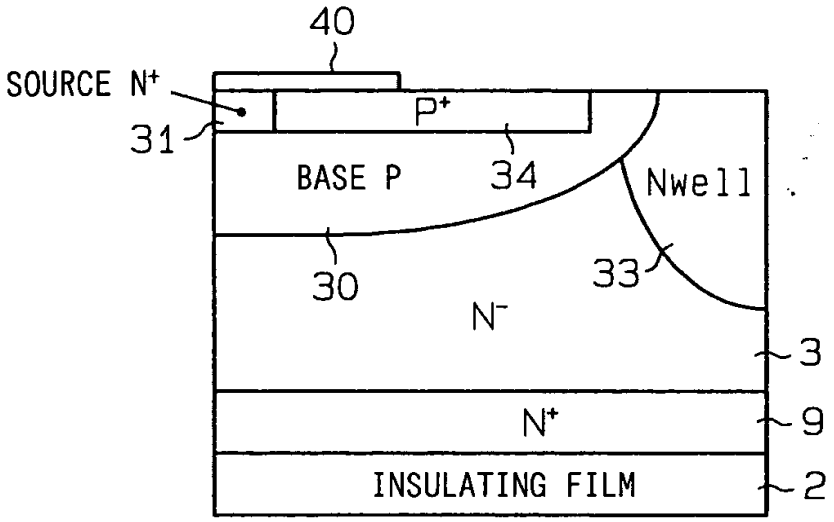

FIG. 31
RELATED ART

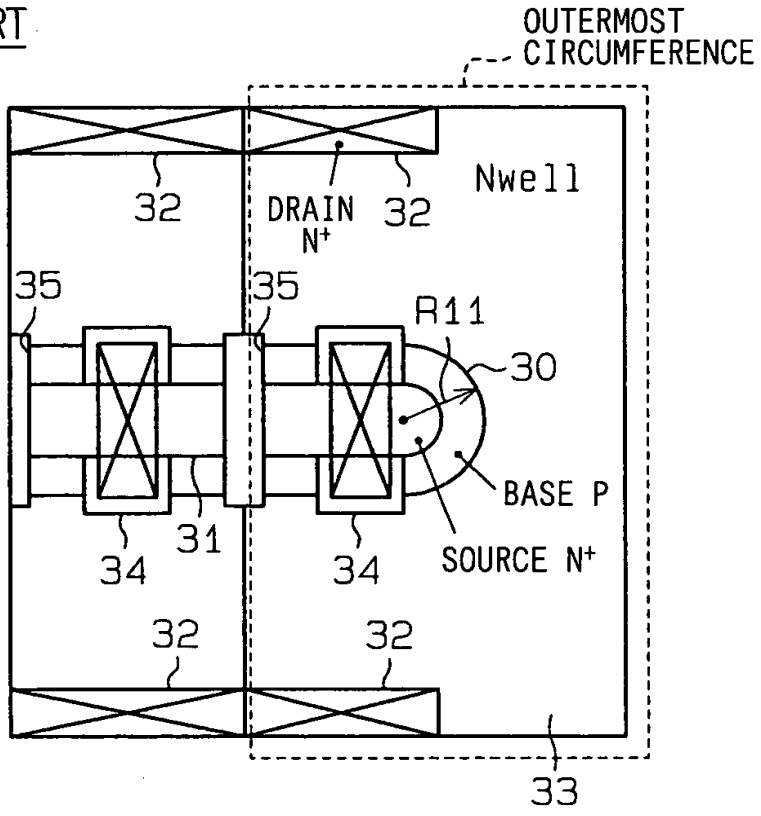

FIG. 32

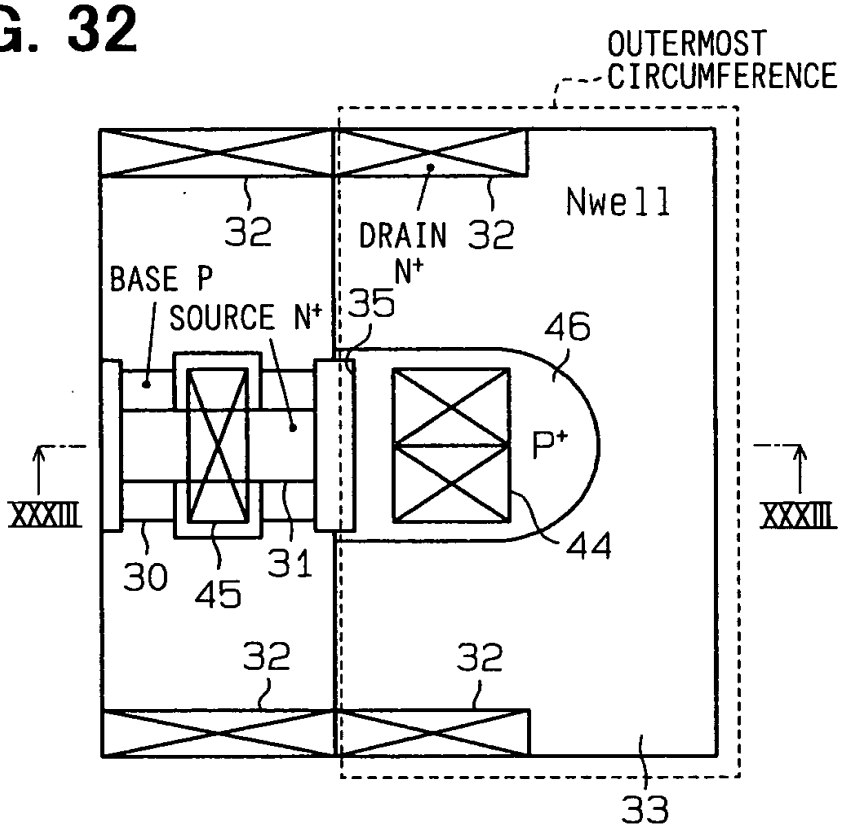
OUTERMOST
CIRCUMFERENCE
Nwell
32
DRAIN
N+
32
BASE P
SOURCE N+
35
46
P+
XXXIII
XXXIII
44
30
45
31
32
32
33

FIG. 33

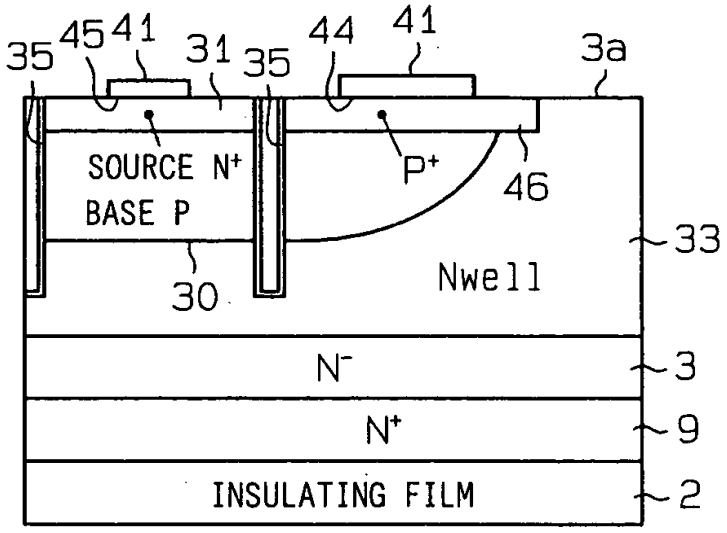
35
45
41
31
35
44
41
3a
SOURCE N+
BASE P
P+
46
33
30
Nwell
N-
3
N+
9
INSULATING FILM
2

FIG. 34

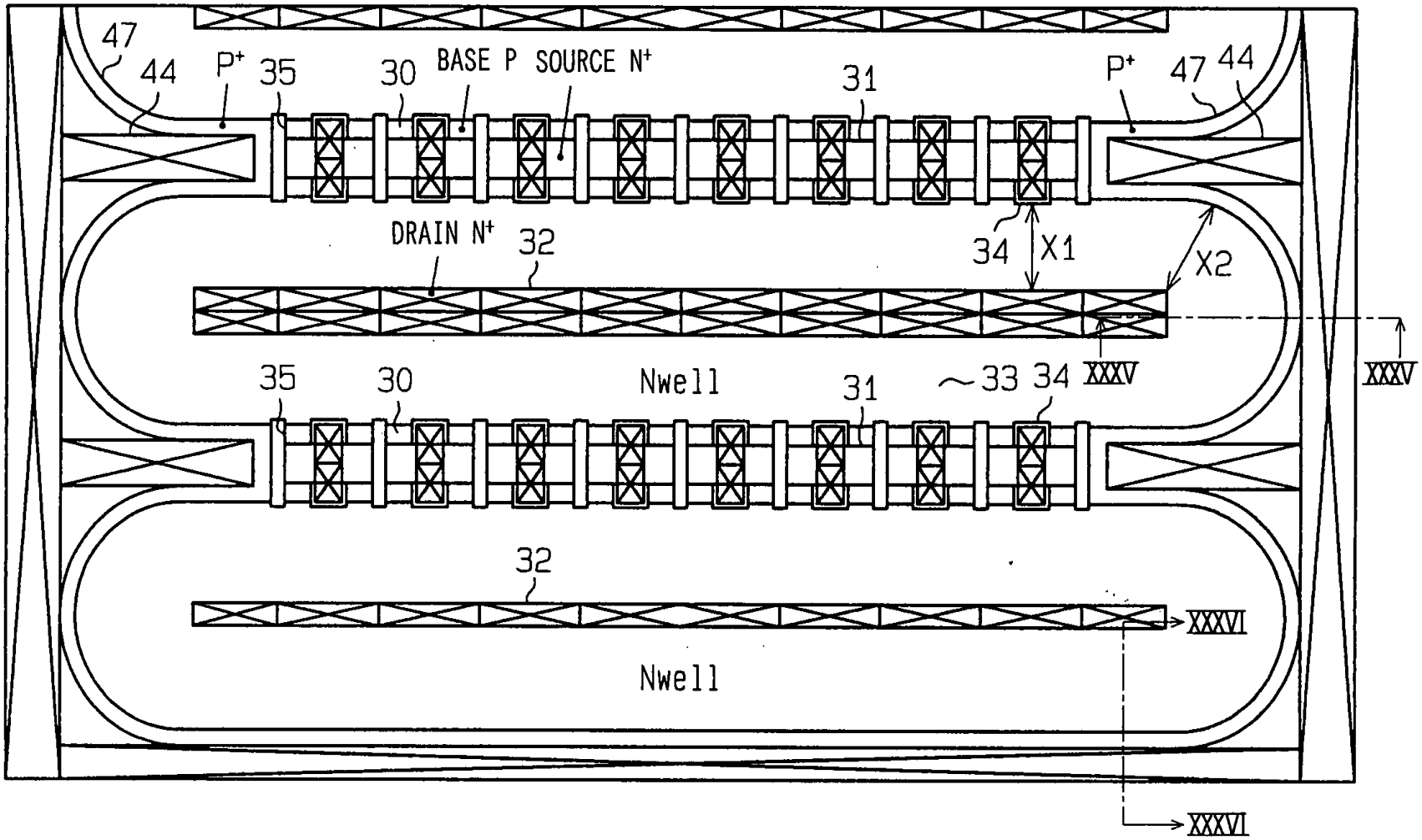
47
44
P+
35
30
BASE P
SOURCE N+
31
P+
47
44
DRAIN N+
32
34
X1
X2
XXXV
XXXV
35
30
Nwell
31
33
34
32
XXXVI
Nwell
XXXVI

FIG. 35

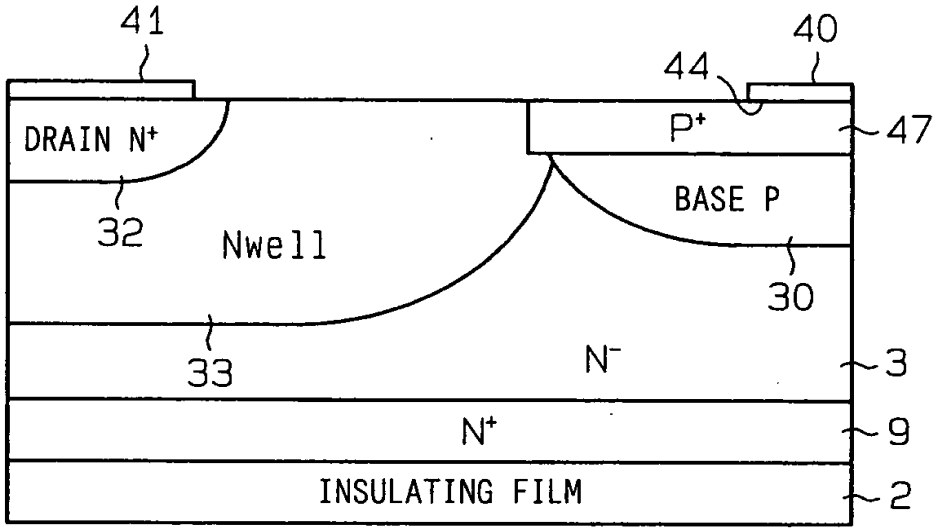
41
40
44
DRAIN N+
P+
47
32
Nwell
BASE P
30
33
N-
3
N+
9
INSULATING FILM
2

FIG. 36

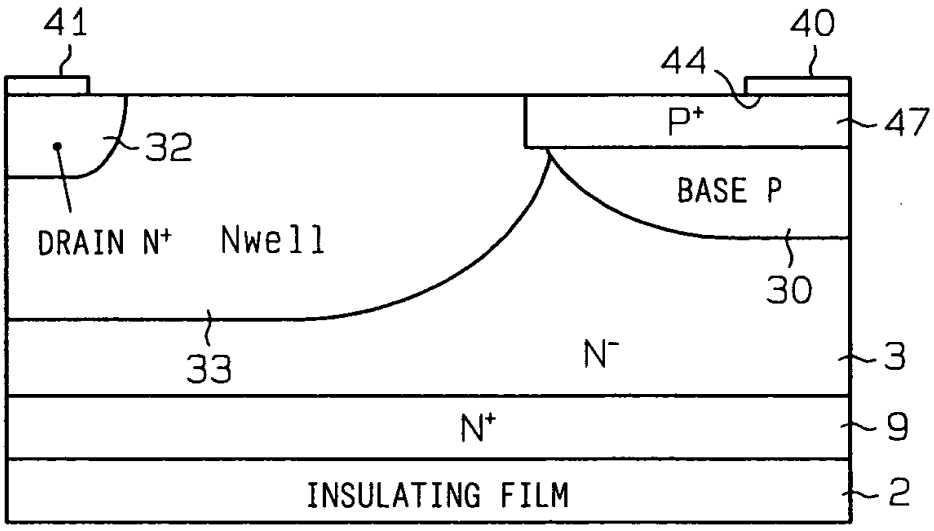
41
40
44
P+
47
32
BASE P
DRAIN N+
Nwell
30
33
N-
3
N+
9
INSULATING FILM
2

FIG. 37A

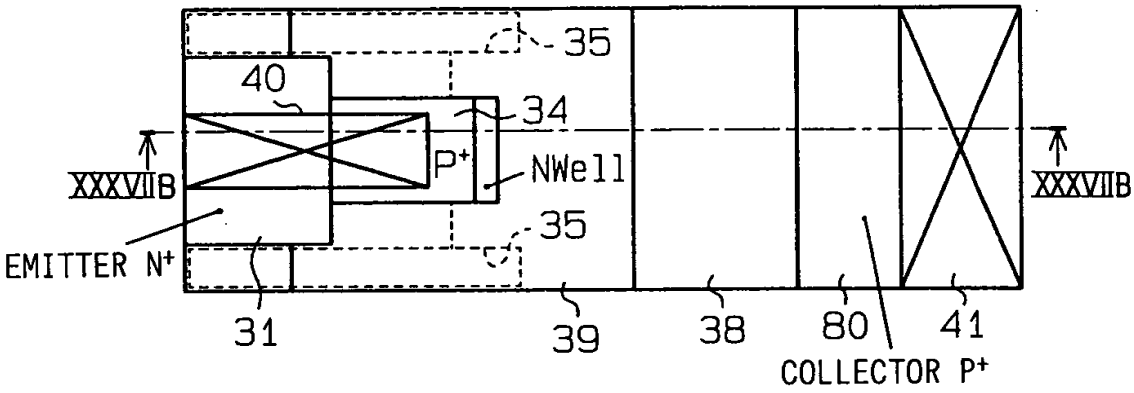

FIG. 37B

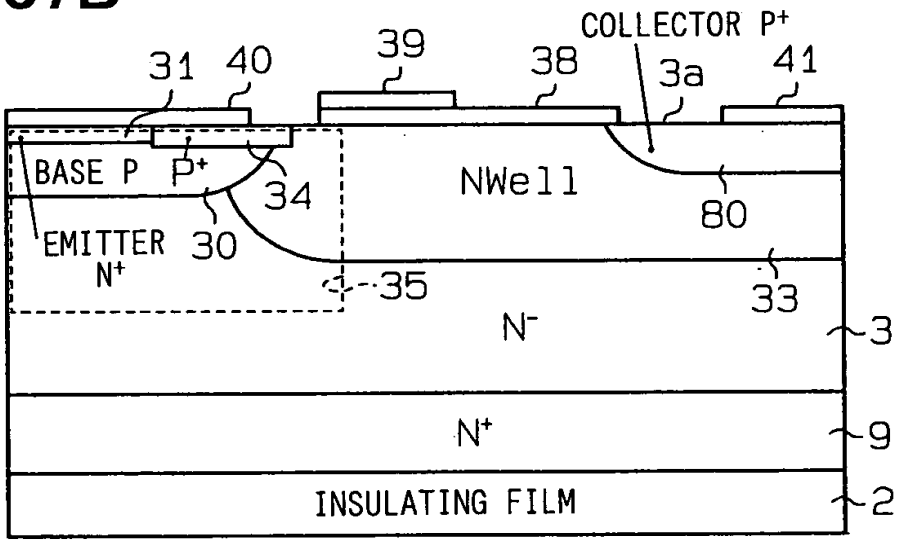

FIG. 38

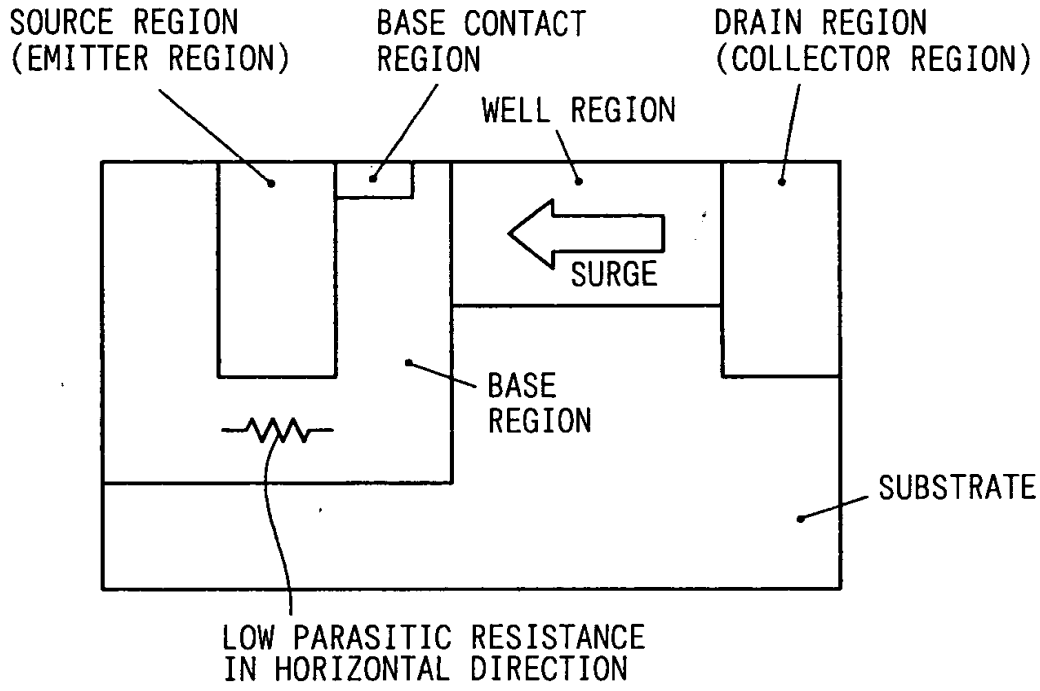

FIG. 39
RELATED ART

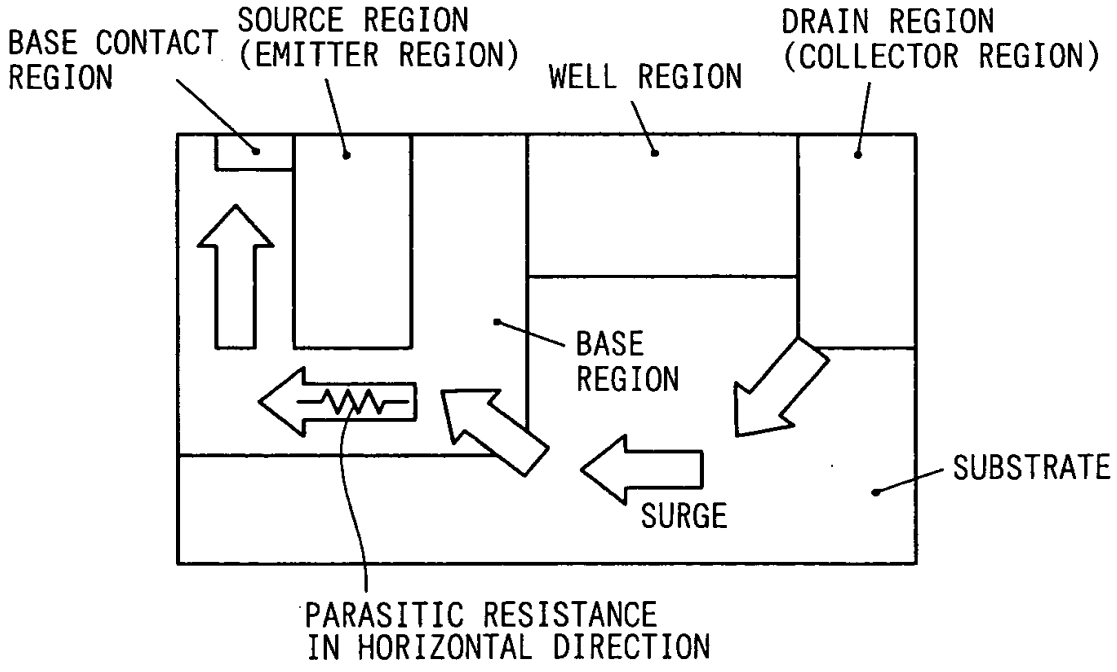

FIG. 40A
PRIOR ART

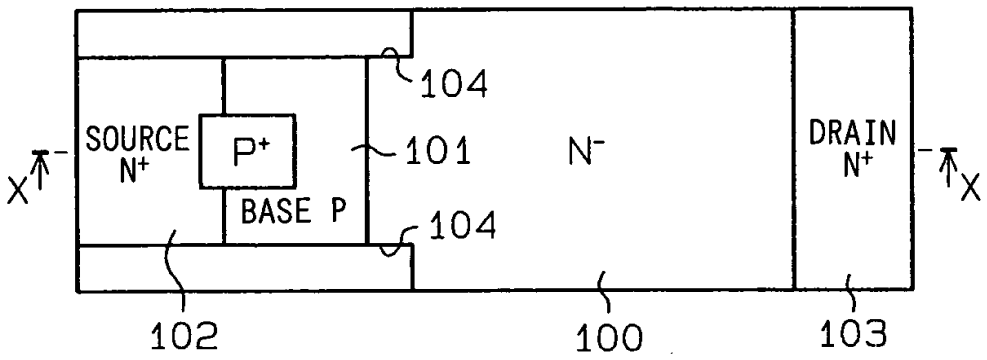

FIG. 40B
PRIOR ART